

NON-PUBLIC?: N  
ACCESSION #: 9010170178  
LICENSEE EVENT REPORT (LER)

FACILITY NAME: LaSalle County Station Unit 2 PAGE: 1 OF 5

DOCKET NUMBER: 05000374

TITLE: Reactor Scram on Generator Lockout during Surveillance Testing  
due to Short to Ground on B Phase Current Transformer in the 2E  
Main Power Transformer  
EVENT DATE: 09/12/90 LER #: 90-010-00 REPORT DATE: 10/11/90

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR  
SECTION:  
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:  
NAME: Larry Bukantis, Technical Staff TELEPHONE: (815) 357-6761  
Engineer, Extension 2576

COMPONENT FAILURE DESCRIPTION:  
CAUSE: X SYSTEM: COMPONENT: MANUFACTURER:  
REPORTABLE NPRDS: Y

SUPPLEMENTAL REPORT EXPECTED: No

#### ABSTRACT:

On September 12, 1990 at 0305 hours, with Unit 2 in Operational Condition 1 (RUN) at 99.9% power, the Unit 2 Nuclear Station Operator (NSO, Licensed Reactor operator) was performing the Turbine Generator Weekly Surveillance (LOS-TG-W1). After the NSO had performed the Generator Regulator Mode transfer switch portion of this surveillance, he noticed a severe transient on several generator output indications. A few seconds after this, the 2E Main Power Transformer B phase differential relay actuated when the current transformer feeding this relay shorted out to ground. As a result, the Unit 2 Main Generator locked out causing the Main Turbine to trip. This immediately caused the Unit 2 reactor to scram. Five Safety Relief Valves actuated to control reactor pressure.

The Initial cause of the transient could not be determined. The B phase

Current Transformer that feeds the B phase differential relay scram was replaced. All affected circuits associated with the Generator's exciter (Alterex) have been tested prior to turbine roll up and once again after the unit was on line. No problems could be found. Unit 2 was restarted and the generator was synchronized to the grid at 0430 hours on September 21, 1990.

This event is reportable pursuant to the requirements of 10CFR50.73(a)(2)(iv) due to the actuation of an Engineered Safety Feature System.

END OF ABSTRACT

TEXT PAGE 2 OF 5

#### PLANT AND SYSTEM IDENTIFICATION

General Electric - Boiling Water Reactor

Energy Industry Identification System (EIIS) codes are identified in the text as XX!.

#### A. CONDITION PRIOR TO EVENT

Unit(s): 2 Event Date: 9/12/90 Event Time: 0305 Hours

Reactor Mode(s): 1 Mode(s) Name: Run Power Level(s): 99.9%

#### B. DESCRIPTION OF EVENT

On September 12, 1990 at 0305 hours, with Unit 2 in Operational Condition 1 (RUN) at 99.9% power, the Unit 2 Nuclear Station Operator (WA, Licensed Reactor Operator) was performing the Turbine Generator (TG) TA! Weekly Surveillance (LOS-TG-W1). A few seconds after the NSO had taken the Generator TB! Regulator Mode transfer switch back to the automatic position, he noticed a severe transient on various Generator Indications. A few seconds after this, the 2E Main Power (MP) EL! Transformer B phase differential current relay actuated. As a result of this, the Unit 2 Main Generator locked out causing the Main Turbine to trip on load reject. This caused a Unit 2 reactor scram due to a turbine control valve fast closure at greater than 30% power. Recovery actions from the scram were normal and reactor parameters were stabilized.

Review of the plant equipment performance after the trip led to investigations of several components described below. No

significant failures occurred.

Upon receiving the transformer phase differential current trip, the Unit 2 East Rain Power Transformer fire protection, FP! KP! deluge actuated. The actuation of the deluge is normal by design, after a phase differential current trip.

After all eight of the Intermediate Range Monitors (IRM,NR) IG! were inserted into the core, the "E" IRM full in indication did not illuminate. The Instrument Maintenance Department found the IRM detector had been over-driven and stuck in past the full-in position. This problem has since been corrected and the E IRM has been cycled several times to assure repeatability without slippage. This had no impact on the event.

During the scram, all Group 1 Safety Relief Valves (SRV,NB) AD! actuated and 3 of the 4 Group 2 SRV's actuated. The Group 2 SRV which did not lift was investigated to assure proper performance. Proper performance was verified.

After the scram both Reactor Recirculation (RR) AD! pumps downshifted to low speed as a result of the turbine trip as expected per design. However, approximately seven minutes after the scram the 2B RR

TEXT PAGE 3 OF 5

#### B. DESCRIPTION OF EVENT (Continued)

pump tripped from low speed to off, as indicated by core flow indication. The exact cause of the pump trip could not be determined. The breaker logic, relay contacts, tachometer power supply, and relay diodes were tested satisfactory. One "high" resistance relay contact in the 2B breaker closing circuit was burnished and retested satisfactorily and one speed tachometer relay setpoint was recalibrated. Successful pump starts into low speed were completed shortly after this testing. Because the downshift was successful during the initial event, the primary consideration of an acceptable plant response that does not complicate the transient for the operators is satisfied.

Reactor Water Level spikes were observed on Startrek (high speed computer recorder), for approximately 1.5 seconds after the scram. At the low level point of the first spike, alarms indicated that the level 2 High Pressure Core Spray (HPCS) BG! initiation setpoint was reached. However, the duration of this actuation was shorter than

the response time of the HFA relay for HPCS initiation. This short duration was the reason that the spikes did not result in a HPCS initiation. The source of the spikes are related to the pressure waves traveling from the Turbine Stop and Control valves up the steam lines into the Reactor Pressure Vessel dome. General Electric was consulted regarding the level spikes and short duration of the HPCS alarms. General Electric indicates that these spikes are expected and were present on the initial cycle load reject start up tests. Actual level did not decrease to the HPCS initiation setpoint.

This event is reportable pursuant to the requirements of 10CFR50.73(a)(2)(iv) due to the actuation of an Engineered Safety Feature System.

### C. APPARENT CAUSE OF EVENT

The apparent cause of this event appears to be a transient that was caused when the operator took the Generator Regulator mode transfer switch from the manual position back to the auto position. It appears that this transient caused the B phase Current Transformer in the 2E Main Power Transformer to short to ground. This ground on the Current Transformer feeding the differential relay scheme, caused the transformer differential relay to trip the generator lockout relay.

A review of the maintenance history for the affected CT revealed that it had previously been isolated due to a suspected ground. When detailed troubleshooting was performed during the subsequent refueling outage, no problem could be found with the CT. The possibility that the CT could have weakened insulation or other internal degradation is considered to be feasible. This could then explain how the CT failure could be initiated during a minor voltage transient which may have occurred during the regulator transfer. Once the CT failure started (arcing), the rest of the NSO's observations would be expected. However, it is not possible to prove or disprove this failure sequence because of the destructive failure of the CT in this event.

A potential cause of this transient appeared to be the Generator exciter's (Alterex) voltage regulator automatic/manual transfer scheme. However, further testing did not reveal any problems with the alterex.

### D. SAFETY ANALYSIS OF EVENT

Safety features were initiated as designed and expected. The generator load reject initiated the proper reactor scram. The event was consistent with a similar event described in the Updated Final Safety Analysis Report (UFSAR), Chapter 15.2.3. It is not expected that this event would have been worse under different initial conditions.

TEXT PAGE 4 OF 5

#### E. CORRECTIVE ACTIONS

1. The voltage regulator section of the Alterex has been tested by the Operational Analysis Department. Testing was performed prior to unit start up and then once again at low power (100MWE). No problem were noted during any of this testing.
2. LaSalle Operating Surveillance LOS-TG-W1 was re-performed during low power operation to determine if the generator voltage transient could be repeated. No abnormalities were noted.
3. Technical Staff will determine if the voltage regulator section of LOS-TG-W1 should be performed weekly. Action Item Record 374-251-90-00118 will track completion of this. Until this Action Item Record can be resolved, this portion of the surveillance will be suspended on both units.
4. The voltage regulator control switch and the relay that this switch actuated was tested on September 19, 1990 and found to be satisfactory by the Technical Staff. (LaSalle Special Test 90-100).
5. On September 13, 1990, the 2E Main Power Transformer was tested. Testing results from the Transformer Turns Ratio, Gas Samples, and Megger were all satisfactory.
6. The 2E Main Power Transformer's Differential Current Transformer (CT) was found to be grounded. This CT was replaced and the transformer returned to service.
7. The Nuclear Engineering Department is investigating instrumentation response to rapid indication spikes and the need for filtering reactor water level signals to prevent spurious actuations of analog trip circuits with fast response transmitters. Action Item Record 374-200-9041/2501 will track

this action.

8. The 2B Reactor Recirculation pump logic, relay contacts, tachometer power supply, and relay diodes were tested satisfactorily. One high resistance relay contact was found in the 2B's closing logic. This contact was cleaned and retested satisfactorily.

9. The Event Frequency Reduction and Post Event Review Program covered under LaSalle Administrative Procedure LAP-200-7, was performed to determine the root cause of the unit trip. After this procedure had been performed, approval for startup was obtained and the unit was brought back on line on September 21, 1990 at 0430 hours.

#### F. PREVIOUS EVENTS

LER Number Title

374/ 86-004-00 Reactor Scram - Loss of 2 East Main Power Transformer due to Freezing Rain.

373/ 87-005-01 Reactor Scram - Due to loss of generator excitation from degradation of the collector brushes.

374/ 84-052-00 Reactor Scram - Turbine Trip when Alterex Detected a Phase Fault.

TEXT PAGE 5 OF 5

#### G. COMPONENT FAILURE DATA

None.

ATTACHMENT 1 TO 9010170178 PAGE 1 OF 1

Commonwealth Edison  
LaSalle County Nuclear Station  
Rural Route #1, Box 220  
Marseilles, Illinois 61341  
Telephone 815/357-6761

October 11, 1990

Director Of Nuclear Reactor Regulation

U. S. Nuclear Regulatory Commission  
Mail Station P1-137  
Washington, D. C. 20555

Dear Sir:

Licensee Event Report #90-010-00, Docket #050-374 is being submitted to your office in accordance with 10CFR50.73(a)(2)(iv).

G. J. Diederich  
Station Manager  
LaSalle County Station

GJD/LAS/lr

Enclosure

xc: Nuclear Licensing Administrator  
NRC Resident Inspector  
NRC Region III Administrator  
INPO - Records center

\*\*\* END OF DOCUMENT \*\*\*

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